the brain casts of tertiary mammals, by A. T. Bruce. *Megencephalon primævus* had a comparatively large and well-convoluted cerebrum, apparently covering most of the cerebellum. On the whole, the casts proved that the brains of tertiary mammals were smaller and less convoluted than those of existing mammals. The last paper in the bulletin is by Professor Scott, upon *Desmatotherium guyoti*, a Lophiodont from the Bridger Eocene, closely allied to Hyrachyus; and *Dilophodon minusculus*, one of the smallest known Lophiodonts, and also closely allied to Hyrachyus.——R. Lydekker has defined the family Camelopardalidæ so as to include six fossil genera, commencing with the existing giraffe, and proceeding through the forms Orasius, Vishnutherium, Helladotherium, Hydaspitherium and Bramatherium, to Sivatherium, the length of the limbs and neck, on the whole, diminishing downward. This view differs from that of Mivart, who places Sivatherium near the prong-buck and Saiga. The long-limbed *Camelopardalis sivalensis* was a contemporary of the short-limbed Sivathere, so that the evolution of the long-limbed form must have been in an earlier epoch.

Post-tertiary.—Professor H. C. Lewis has published an abstract of a lecture on "The great Ice age in Pennsylvania." In it he states that "there is every proof that, ages ago, * * * the great Greenland glacier crept down so as to overspread the north-eastern part of America and the north-western part of Europe." He treats of this northern glacier as a sheet reaching from "Greenland to St. Louis, and from Alaska to New Jersey, so thick as to overtop Mt. Washington," estimates its thickness in New England at 5000 feet, and gives reasons for supposing that the melting of the glacier need not be longer than from 10,000 to 15,000 years ago. In a lecture upon the geology of the neighborhood of Philadelphia, he defines the alluvium, Trenton gravel, brick clay, red and yellow gravels, etc., and traces their history.

BOTANY.[1]

The Growth of Plants in Acid Solutions. I.—The watering of plants with alkaline solutions, soluble phosphates, and organic extracts has been very extensively and variously experimented upon, but any comparative examination of a series of plants treated under the same conditions with acid waters has not to my knowledge been published. The experiments described below originated in an inquiry as to what extent acids would affect vegetation, and whether apprehensions aroused by the reported destruction of trees through acid precipitation from manufactures were justified.

The plants experimented with were specimens of the silver-leaf geranium, so commonly used in combination with the fish geranium in ornamental flower beds, both being varieties of the same

[1] Edited by Prof. C. E. Bessey, Ames, Iowa.

species perpetuated by the gardener's skill and selection. Ten plants in very nearly the same conditions of growth, size and characters, were potted in good garden mold with manure, and were watered with solutions of nine acids and with ordinary rain water, the same solution being applied to one plant throughout the season uninterruptedly, and only in a few cases altered in strength. The rain water was used with one plant only, whose deportment was taken as a standard by which the effects of the acids were gauged, and it was used continuously with this one alone, an occasional application of water upon the rest supervening only after a very long treatment with acids. The acids employed were hydrochloric, nitric, sulphuric, formic, carbolic, tartaric, citric, tannic, and salycylic. The experiment began June 22, 1882, and lasted until September 6. The strength of acid solutions was 10^{cc} of acid, concentrated in case of the inorganic acids, and saturated cold solutions of the organic acids, in one litre of water. The solution of the salycylic acid was assisted by a slight addition of alcohol to water. The liquid volume used daily of these solutions for watering each plant was 115^{cc}.

The organic acid solutions were strengthened on Aug. 1 to 40^{cc} of the saturated acid to one litre of water, with the exception of carbolic and formic, which were retained at their original strength, and the amount of both these latter, together with that of hydrochloric, nitric, and sulphuric acids, used to water the plants was reduced one-half. The behavior of these plants in detail was as follows, the plants being classed according to the *acid used:*

	June 25.	July 13.	Aug. 24.
Hydrochloric ..	6 full leaves.	6 full leaves; stunted.	5 full leaves.
Nitric.....	5 " "	4 " " "	2 " "
Carbolic.....	4 " "	2 " " "	None.
Formic.....	4 " "	6 " " "	5 full leaves.
Salycylic.....	6 " "	7 " " growing.	4 " "
Sulphuric.....	7 " "	5 " " stunted.	2 " "
Tartaric.....	7 " "	9 " " growing.	9 " "
Tannic.....	6 " "	9 " " "	9 " "
Citric.....	5 " "	7 " " "	7 " "
Water.....	11 " "	13 " " "	17 " "

From the first day of the experiment the first six plants, with the exception of the salycylic, were unfavorably affected by the acids used, but maintained a deceptive appearance of vitality by curtailing their expenditure of force in growing and applying it upon a maintenance of leaves. The doses appeared severe, but none of them died excepting the carbolic-acid plant, which very soon became debilitated and indigent, and the nitric-acid plant which died shortly after the experiment terminated. Of the rest the sulphuric-acid plant was the most thriving, then the hydrochloric-acid plant, and last, and just alive, the plant treated with formic acid. They were all stunted and depauperate in appearance. The remaining plants grew well and, except in fertility of

leaves, were not strikingly inferior in appearance to the water plant. The soils treated with inorganic acids first lost their retentiveness, and eventually all became similarly affected. The water plant alone formed a secondary radical branch.—*L. P. Gratacap, 77th st. and 8th ave., New York City.*

TUCKAHOE.—In the forthcoming volume of the Smithsonian report. Professor J. Howard Gore will have a paper on tuckahoe, or Indian bread. The word is a very common one in the sandy region of the Atlantic slope, but it does not apply to the same substance, being applied to Orontium, *Arum virginicum*, *Convolvulus panduratus* as well as to various fungi. The synonymy is quite formidable of the true tuckahoe, as *Pachyma cocos* (Fries), *Pachyma solidum* (Oken), *Pachyma pinetorum* (Horaninow), *Pachyma coniferarum* (Horaninow), *Lycoperdon solidum* (Clayton), *Lycoperdon sclerocium* (Nuttall), *Lycoperdon cervinum* (Walter), *Sclerocium cocos* (Schweinitz), *Sclerocium giganteum* (MacBride), *Tuckhaus rugosus* (Rafinesque).

The affinities, habitat, growth and formation and chemical composition are worked out with the greatest care, several tables of analyses being given.

"The most notable peculiarities of this substance are the entire absence of starch ('No fungus has yet been found to contain true starch,' Sach's 'Botany,' p. 241), the comparatively small amounts extracted by solvents, the gelatinous character of the cellulose, and the very small amount of albuminous substance. Nothing else yet analyzed has been reported to contain so large a proportion of pectinous matter. In ordinary fruits, such as are commonly used for making jellies, these pectin bodies seldom amount to ten per cent. According to Sach's Botany, 'the origin of colloidal pectin is still unknown.' Its nutritive value seems also to be entirely undecided. The older writers considered the pectin bodies of no value as foods, while later authors seem inclined to give them a value approximately that of starch. It seems certain that a diet of tuckahoe (*P. cocos*) alone would not sustain life, because of the lack of sufficient nitrogenous materials to repair the waste in the animal tissues; still, it might prove a valuable adjunct to highly nitrogenous foods.

"Various medicinal properties have been ascribed to *P. cocos*, such as an antidote to mineral poisons, for poultices on the ulcers that follow yellow fever, diarrhœa, cancers, and the most startling of all—the statement made in Hobb's 'Botanical Hand-book'—that it is aphrodisiac. It is easy to understand how these properties could be ascribed to tuckahoe—a representative name for all round or tuberous esculent roots—and now when *P. cocos* is the only root bearing the name of tuckahoe, it retains the traditional virtues of a large part of the Indian materia medica. From the large number of correspondents upon this subject, not one has been found who ever knew of any use to which it has been

put. So we may safely conclude that *P. cocos* possesses no practical value; but it is unsurpassed in interest from a botanical standpoint, especially since so little is known concerning it."

NEW PLANTS FROM CALIFORNIA AND NEVADA, ETC. II.—*Cymopterus corrugatus*, n. sp..—Nearly acaulescent, perennial; summit of the stipe bearing a whorl of usually three leaves and three or more sessile or long peduncled compound umbels; leaves ovate, leathery, veiny, pinnate or occasionally twice-pinnate, leaflets ternately or rarely pinnately parted or lobed, broadly ovate to cordate-ovate, lobes with a broadly cuneate base and rounded, very obtuse teeth, each with a white, very sharp mucro; petioles nearly equaling the blade, which is 3′–4′ long; root-leaves none; involucre absent or rarely present as a leafy bract; summit of the peduncle much thickened, and with the pedicels fleshy, involucels unilateral, scarious, of many scales united into a cup or almost entirely separate, scales tapering into a fine, thread-like point; flowers white, short-stalked; pedicels 6″–1′ long; fruit 3″ long, oblong, curved, with very thin corrugated wings.

This plant resembles *C. fendleri* and *C. glomeratus*.

Rose creek, Nevada, June, 1882.

Iva nevadensis, n. sp.—Annual, 6′–12′ high, widely branching from the base; strigosely pubescent all over with blunt, many-jointed white hairs; leaves about 2′ long, alternate, once to twice ternately or pinnately parted, very broadly obovate to oblanceolate in outline, all with a rather long cuneate base, petiole margined or winged, often 1′ long; inflorescence wholly axillary; heads white-hairy, rounded, one to several in a leafy bracted, short-stalked, erect or nodding, cluster; involucral scales leafy, usually three, somewhat united, in a single series; fertile flowers few, sterile numerous; corolla very hairy at tip; achene finely striate.

A peculiar and very interesting addition, requiring some modification of the generic characters. Hawthorne and Wadsworth, Nevada, June, 1882.

Cereus maritimus, n. sp.—Cæspitose, heads 5–200 in a bunch, which is often 2°–3° in diameter and 1° high; each plant cylindrical, ovate or in small specimens almost round, 1½′–4′ long, ¾′–1½′ wide; principal spines 4, straight, angled and somewhat twisted at base, 1′–1½′ long, beneath these are 8–10 very short spines which are either straight or hooked; spines light brown, except when young, then red at base, springing from a very short but copious wool; flowers light yellow, about 1½′ long and wide; petals oblanceolate or obovate, rounded, margin irregular; ovary obovate, sessile or short-stalked, covered with bunches of white or yellow, often hooked, short spines and crisped wool; fruit not mature.

Encinada, Mexico, April, 1882.

Other plants soon to be described are *Lagia jonesii* Gr., *Eri-*

trichium micromeris Gr., *Poa nevadensis* Vasey, *elongata* Vasey, *Stipa stricta* Vasey, *Festuca jonesii* Vasey, two other grasses and three ar four other phanerogams, as well as half a dozen species of new fungi. Some half dozen species are not yet named beside. Plants belonging to the same collection as new species, are *Breweria minima* Gr., *Draba unilateralis* Jones, *Rosa minutifolia* Eng., *Ribes viburnifolium* Gr., *Æsculus parryi* Gr., etc.—*Marcus E. Jones, Salt Lake City, Utah.*

BOTANICAL NOTES.—The June *Journal of Botany* contains a photograph, with a sketch of the life and labors of the late George Stacy Gibson, F.L.S., a local English botanist of considerable reputation.——In the same journal H. F. Hance describes a new species of Podophyllum, *P. pleianthum*, from the Island of Formosa. This makes the third species of this genus; the oldest is the familiar May apple of our woods, *P. peltatum* Linn., the second is *P. emodi* Wall. Both these have solitary white flowers. The new species, however, has five or six dull red flowers, which hang in a pendulous group from the fork of the stem-leaves.—— Dr. Cooke, in the June *Grevillea*, enters a most emphatic protest against the radical changes in specific names which the new views as to the real nature of the Uredineæ have brought in, in certain quarters. He has our hearty sympathy. We do not like, for example, to give up *Puccinia compositarum* for *P. flosculosorum* simply because Albertini and Schweinitz happened to name one of its stages *Uredo flosculosorum*. We wish the editor of *Grevillea* all success in his war upon this ultra stickling for strict application of the letter (not the spirit) of the law of priority.—— We have received Arthur Meyer's brochure, Das Chlorophyllkorn in Chemischer, Morphologischer und Biologischer Beziehung (Arthur Felix, Leipzig). It contains ninety-one quarto pages of text and three fine lithographic plates. We hope to be able to notice it in full before long.——In the bulletin of the Minn. Acad. Nat. Sci., Vol. XI, Mr. J. C. Arthur publishes "Descriptions of Iowa Uromyces." As stated in the preface, "It is an attempt to clear up the synonymy, and to give a uniform and sufficiently full specific description to permit accurate identification, with critical and explanatory notes of the species belonging to this single genus." The descriptions have all been written directly from the specimens, and in so far as possible all the stages (*æcidium*, *uredo*, and *teleutospore*) are described with fullness. This is an attempt in the right direction, which it is to be hoped other students of the lower plants will imitate.——A. F. Foerste in the June *Botanical Gazette* describes an enormous poison ivy (*Rhus toxicodendron*) found near Dayton, Ohio, which measured some distance from the base seventeen inches in circumference. Its first branch was fourteen and a half inches in circumference, and another was about twelve inches.——From Houghton Farm Experiment Station Professor Penhallow has

issued a bulletin on Diseases of Plants, this number being devoted to (1) the normal condition of vegetable structure with reference to cell contents, and (2) peach yellows. The work appears to be well and carefully done. Four good colored plates accompany the second paper.

ENTOMOLOGY.[1]

THE OLD, OLD QUESTION OF SPECIES.—Dr. H. A. Hagen and Mr. William H. Edwards have drawn swords on the question as to how many species of Papilio of the *machaon* group we really have. As the question is one of opinion we do not expect either to convince the other. Dr. Hagen's method, which is too much based on the idea of fixity in species, would, if fully carried out, do away with all divisions; while Mr. Edwards's, though based on a more philosophic and correct view of nature, too often rates as species what the majority of naturalists would rate as varieties or races. In both directions the objects of classification may be perverted. There is, therefore, room for modification of the extreme views of both disputants. Meanwhile the debate gives scope to rhetoric and argument, and enlivens the monotony of the mass of descriptive matter that has hitherto prevailed in "Papilio," and rendered it rather dry to all but the describers. Dr. Hagen is certainly not less capable of sound judgment, because he has achieved distinction in other fields, and has made a specialty of another order. Rather should his judgment be the sounder on such a point. Nor have Mr. Edwards's views additional weight because of his well-known tendency to make species to be subsequently annihilated by himself or others, upon fuller knowledge. In default of actual proof by breeding Dr. Hagen has adopted the next best test, viz: the inseparability of the various forms. Just as extensive rearing from the larvæ in a given region almost invariably reduces the number of "species," and broadens our conception of the limits of specific variation in such region; so the comparison of extensive material from all regions emphasizes the principles of evolution by showing inseparable series and consequent genetic relationship. In this way not only species but genera often lose the definiteness they previously possessed, and we have only series left. Yet the value of separating this series into more or less constant sets known as varieties, species, genera, etc., with their sub-divisions, is too apparent to need argument, and only he who believes in the fixity of "species" in all time will be puzzled and baffled by the facts. Mr. Edwards will, therefore, have the support of entomologists generally, and shows, in fact, full knowledge of his subject and admirable humor in discussing it.

MYRMECOPHILA.—Prior to 1876 this interesting genus of little crickets was not known to occur in this country. Harris had

[1] This department is edited by PROF. C. V. RILEY, Washington, D. C., to whom communications, books for notice, etc., may be sent.